

Analysing the Renewable Energy Integration Paradigm in the Post-COVID-19 Era: An Examination of the Upcoming Energy Law of China

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Abstract—China's declared transformation towards a 'new electricity system dominated by renewable energy' requires a cleaner electricity consumption mix with high shares of renewable energy sourced-electricity (RES-E). Unfortunately, integration of RES-E into Chinese electricity markets remains a problem pending more robust legal support, evidenced by the curtailment of wind and solar power due to integration constraints. The upcoming Energy Law of the PRC (Energy Law) is expected to provide such long-awaited support and coordinate the existing diverse sector-specific laws to deal with the weak implementation that dampening the delivery of their desired regulatory effects. However, in the shadow of the COVID-19 crisis, it remains uncertain how this new Energy Law brings synergies to RES-E integration, mindful of the significant impacts of the pandemic. Through the theoretical lens of the interplay between China's electricity market reform and legislative development, this paper investigates whether there is a paradigm shift in Energy Law regarding renewable energy integration compared with the existing sector-specific energy laws. It examines the 2020 Draft for Comments on the Energy Law and analyses its relationship with sector-specific energy laws focusing on RES-E integration. The comparison is drawn upon five critical aspects of the RES-E integration issue, including the status of renewables, marketisation, incentive schemes, consumption mechanisms, access to power grids and dispatching. The analysis shows that it is reasonable to expect a more open and well-organised electricity market, enabling the absorption of high shares of RES-E. The present paper concludes that a period of prosperous development of RES-E in the post-COVID-19 era can be anticipated with the legal support by the upcoming Energy Law. It contributes to understanding the signals China is sending regarding the transition towards a cleaner energy future.

Keywords—Energy law, energy transition, electricity market reform, renewable energy integration.

I. INTRODUCTION

THE electricity sector plays a pivotal role in the transition towards a cleaner energy future. Among electricity generated from diverse energy sources, intermittent or variable renewable energy, notably wind power and solar PV power, poses significant challenges to electricity network operation due to their unstable or unreliable output features. Compared with electricity generated from conventional fossil fuels, RES-E is more expensive since it relies on less-proven technology, which involves high upfront costs. Although they only represent a relatively small portion of the electricity mix at the present stage, RES-E is a cleaner alternative to the more carbon-

intensive fossil fuels, and the share of RES-E in the future electricity mix is expected to increase as this is in line with climate change mitigation objectives.

Nowadays, variable or intermittent renewable energy sources such as wind and solar PV energy have reached grid parity in many countries, which means that electricity generation from these renewable energy sources costs the same as conventional fossil fuels. Moreover, it even becomes cheaper than conventional thermal power generation in some countries. This is a welcome trend due to its contribution to decarbonise the electricity sector and achieve sustainability goals [1]. The development and utilisation of technology have enabled the reliable integration of variable or intermittent renewable energy in many countries [1]. Integration of variable or intermittent renewable energy is technically feasible with the advance of technology. The legislature has to respond and capture this development timely, which requires adjusting regulations, policies, and the market design according to the latest development in the clean energy transition.

There have been challenges of clean energy transition identified by the literature. This research focuses on the issue of renewable energy integration in China for three reasons. Firstly, China is considered the leading position in global renewable energy development regarding installed capacity and equipment manufacturing [2]. However, this does not translate into the utmost renewable energy utilisation because of the difficulties of being integrated into electricity systems. This constitutes the second reason for targeting the issue of renewable energy integration in China. The particular challenges of renewable energy integration in China are evidenced by the high curtailment rate in the 'Three North' areas (Northern China, North-East China, and North-West China). For example, the wind power curtailment rate in 2019 is 7.1%, 7.6%, and 14% in the northern and north-western provinces of Inner Mongolia, Gansu, and Xinjiang, respectively [3]. Although this has been less severe than in 2017 when the curtailment rate for wind power reached 33% in Gansu Province [4], renewable energy curtailment remains an issue in some areas, given China's ambitious climate goals. Thirdly, China is the biggest CO₂ emitter globally [5], a large portion of which derives from the energy sector. This also drives China's endeavours to clean up its electricity mix.

Prior to the COVID-19 pandemic, there have been

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declarations on making efforts to transition from a coal-driven electricity system to a less carbon-intensive one with higher shares of renewable energy in the electricity mix; for example, the Energy Technology Revolution Innovation Action Plan 2016-2030 [6], the Energy Production and Consumption Revolution Strategy 2016-2030 [7], and the Fourteenth Five Year Plan 2016-2020 [8]. These efforts contributed to a decrease of the share of coal in the total electricity mix from around 73% in 2015 (according to the data retrieved from 'energy supply' by the indicator of 'electricity generation by source' at China - Countries & Regions – International Energy Agency) to 69% in 2020 (see data from International Energy Agency, at Electricity mix in China, Q1 2020 – Charts – Data & Statistics).

However, further steps in the post-COVID-19 era are needed to fulfil China's commitment to achieving the carbon peak by 2030 and carbon neutrality by 2060, as announced by President Xi Jinping at the General Debate of the 75th Session of The United Nations General Assembly in September 2020. To achieve carbon neutrality means that "China would remove the same amount of carbon it is emitting into the atmosphere to achieve carbon neutrality carbon emissions" [9]. The 2030 carbon peak and 2060 carbon neutrality pledges are unprecedented ambitious targets, the equivalent of which is "decarbonising the entire French economy annually for 30 consecutive years" [10]. Although this is not a legally binding obligation and detailed short-term action plans to achieve these targets are still under discussion and remain unclear, these strategic planning documents and proclamations from the Chinese central leadership send signals of promoting renewable energy and demonstrate the determination to transform China's energy sector towards a cleaner energy future.

The existing legal literature does not deal with the RES-E integration issue in China sufficiently. Little of it is from a systematic perspective, including the updates on the new Energy Law. The surprising resilience of RES-E demonstrated during the COVID-19 pandemic enhanced confidence and determination in RES-E integration, which makes it a hot topic and gaining momentum in academia. Unfortunately, there is still a lack of attention on the linkage of the new Energy Law to the existing separate sector-specific laws and regulations from the perspective of RES-E integration. Therefore, this research adopts a more holistic viewpoint of China's legal system and aims at answering the research question of how the latest 2020 Draft of Comment for Energy Law demonstrates a more friendly paradigm for RES-E integration. The analysis builds upon the interplay between electricity market reforms and energy legislative development in China, providing a theoretical framework for further discussion on the upcoming Energy Law's legal support for developing RES-E and electricity market reforms.

As this article does not look into the various regulatory documents that provide details for implementation, it looks at the issue from a more general and broad view through examining the basic laws which are in a near hierarchy in China's legal system deciding the overarching direction of the development of RES-E in general in the near future. This

approach allows a macro perspective that zooms out and looks at the broader picture, which helps understand the overall principles of renewable energy integration. These basic laws to be examined include the Renewable Energy Law of the PRC (hereinafter referred to as the Renewable Energy Law) [11], the Electric Power Law of the PRC (hereinafter referred to as the Electric Power Law) [12], and the Regulation on the Administration of Power Grid Scheduling (hereinafter referred to as the Scheduling Regulation) [13]. The comparison is analysed into five critical aspects around renewable energy integration, including the status of renewable energy, marketisation, and incentives for developing renewables, consumption mechanisms, and access and dispatching. It also considers that the upcoming Energy Law will take effect under the COVID-19 crisis, which raised the awareness of the importance of renewable energy integration in the clean energy transition in China.

II. THEORETICAL FRAMEWORK: THE INTERPLAY BETWEEN ELECTRICITY MARKET REFORMS AND ENERGY LEGISLATIVE DEVELOPMENT IN CHINA

International experience shows that legislative development is closely interlinked to electricity market reforms as one of the key aspects of economic growth based on the rule of law. For example, the electricity market reforms led by the European Union's Directives and Regulations are considered one of the most successful models enabling competition and efficiency improvement in the electricity sector. This is achieved based on the legal requirements and support by the EU Electricity Directives. The EU Electricity Directives lay out guidance for the Member States to implement reform measures according to particularities of different jurisdictions. The legal support provides protection to market participants. Legislation, including market rules and regulations in the EU textbook reform, provide legal certainty for market participants. For example, investors make their investment decisions based on the legitimate expectation to recover the costs. This expectation is formed on the basis of the legal clarity of legislation. However, China adopted a subtle approach that demonstrates a slight difference from the EU textbook reform. This is rooted in the overall economic development since the 1978 reform and opening-up when China had no well-established legislation and reform model. Similar to reforms in other sectors, electricity sector reforms started in the way of 'crossing the river by feeling for the stones' (or also referred to as the 'feel the way' approach) [摸着石头过河 in Chinese], which means that China confirms the good practice of reform measures afterwards by trial and error method. It was applied to Chinese economic reforms officially for the first time by Chen Yun [陈云 in Chinese], one of the members of the Central Leadership Group, when addressing the price inflation in the 27th Meeting of the Administrative Council in 1950 [14]. This try-out and play approach of Chinese electricity market reform in the early stage ran the risks of impairing the foundation of the rule of law since reform measures without a solid legal basis in the high hierarchy would impact the legitimacy of market reforms. A

weak legal basis also causes difficulties in the implementation of reform measures. The latest round of electricity market in China lacks a robust legal foundation since it is implemented according to the No.9 Document issued by the State Council, which is not a law in the strict sense in China's legal system and lacks legal force [15]. The electricity market reforms will stagnate if the No.9 Document is revoked.

The interplay between electricity market reforms and energy legislative development in China is analysed into two aspects: on the one hand, electricity market reforms drive the legislative development, which demonstrates legal adaptability; on the other hand, energy legislation provides legal certainty and support for market reforms.

In promoting the rule of law by President Xi Jinping, the importance of legal basis for electricity market reforms is gaining more attention. The Chinese leadership is making efforts to combine the way of 'crossing the river by feeling for the stones' with 'top-level design' [顶层设计 in Chinese].

The term 'top-level design' (or referred to as 'top-down design') is a manifestation of the rule of law in contemporary China under the leadership of President Xi Jinping. It is a concept borrowed from systems engineering, referring to the usage of system theory and handling the project from the overall and top-level perspective. It extends to social science research and is introduced to studies on social reforms as a principle of holistic design and strategic vision of the general reform process. In political economics, it emphasises planning as a whole, integrating and coordinating reform goals, tasks, critical steps and the sequential order to promote the reform in a stable, progressive and gradual manner [16]. Even before President Xi's leadership, the concept of 'top-level design' gained momentum for the first time during the Fifth Session of the Seventeenth Central Committee of the Communist Party of China (CPC), with a strong association with the well-known economist and policy adviser Liu He [17]. It was mentioned as 'attach importance to the top-level design of reforms and overarching planning'. It was further developed into 'strengthening the top-level design and making a significant breakthrough in critical areas and reform steps' on the later Central Economic Working Conference [18]. The Third Session of the Eighteenth CPC Central Committee further emphasised that the 'top-level design' should be combined [19] [20]. The 'top-level design' is dialectically unified with the 'crossing the river by feeling for the stones' approach [21]. The adoption of 'top-level design' does not necessarily mean that the 'crossing the river by feeling for the stones' approach should be denied [16]. On the contrary, the 'feel the way' approach suits the situation of the reforms in early stages in China, lays the foundation for 'top-level design' and paves the way for the implementation of the designed plans [21].

In the electricity sector, energy legislation represents one of the critical aspects of 'top-level design' since it constitutes essential considerations for designing the overarching reform pathway [22]. As one of the key areas of economic reform in China, electricity market reforms need to be promoted under the rule of law framework. Therefore, the interplay between energy legislation and electricity market reforms can also be

interpreted and understood from the lens of the relationship between the 'feel the way' approach and the notion of 'top-level design'. This research builds up the theoretical framework for the analysis on the upcoming Energy Law (as a part of comprehensive legislative development in the energy sector) and renewable energy integration (one of the challenges that electricity market reforms need to address). The following section presents the theoretical framework from two dimensions – legal adaptability and legal certainty. The former considers electricity market reforms as a driving force in facilitating energy legislative development; and the latter emphasises that energy legislation is a means of providing support for the electricity market reforms. These are two aims that lawmakers need to balance.

A. Legal Adaptability: Electricity Market Reforms as the Driving Force in Facilitating Energy Legislative Development

Reforms are a form of social change or development that laws need to respond to and react to. Legal adaptability is a concept to defining the degree of adaptation to relations that the statutes regulate and 'the degree of its autonomy as a regulator and controller of the development of these relations' [23], [24]. Electricity market reforms drive the development of legislation since the emerging issues that existing laws and regulations fail to address the need to be handled by legislators timely. Otherwise, these practical issues have the potential to resist further reforms or undermine the achievement of previous reforms. In the case of China, electricity market reforms constitute a critical source driving energy legislation. This is because the 'feel the way' method dominates the reform in the early stage. In the context of the transition from a planned economy to a market-based one, there is no reference for China to reform its electricity sector. It tried different approaches in pilots and then summarised experiences learned from practice. The information gained from trial pilots then become an important source of information for energy legislation. This approach is in line with the situation in which China started the reform when the legal system is not well-established in the 1980s. It left space for legislative development after reform practice proved successful and gave insights to legislative activities. Reforms provide a source of energy that fuels the lawmakers to update the legal system to catch up and facilitate the reforms progress. The value of legal adaptability also lies in the flexibility that it brings to the legal system. Without a certain degree of flexibility that is allowed, electricity market reforms will not be possible. Some reform measures seem to contradict existing laws initially. However, it can be justified if the reform steps promote public social welfare, e.g., conducive to sustainable development. On the other side of the story, it is worth noting that the notion of legal adaptability is also criticised since it fails to capture to what extent 'law "matters" for development', not merely responds to external circumstances [25].

B. Legal Certainty: Energy Legislation Providing Support for Electricity Market Reforms

Legal certainty is crucial to most capital-intensive

investments, including energy sectors. Investors have to make their investment decisions based on the belief that laws will not change randomly in a way that hampers their potential recovery of investment costs. Investment in energy sectors is usually in the long term with a substantial amount of upfront investment costs. Suppose the legal system is unstable and subject to potential change, investors will be exposed to high risks of not earning the expected return. This will undermine investors' confidence and consequently make them invest less or decide to invest in a particular jurisdiction. In this sense, energy legislation supports a stable and specific environment where investors can foresee the return of their investment can be ensured by the legal system *ex-ante* by published regulations or *ex-post* by dispute resolution channels provided by laws in a certain period.

To ensure legal certainty, one of the critical elements is to improve the quality of legislation. This means that sufficient knowledge and information needs to be acquired in the legislative activities. Involving experts and academic human resources can be helpful to reduce the chance for the need to revise in a short time, which enhance the stability of the legislation. Moreover, clarity is another aspect of improving legal certainty since legislation must be sufficiently clear to implement.

The energy legislation in China is not satisfactorily well-developed, and there is no comprehensive code for the energy sector up to date. Some of the laws and regulations lack behind reform practice. This is hindering further reform. For example, implementation of reform measures faces difficulties since electricity market participants may be confused and unsure how to deal with the conflict between newly issued reform regulatory documents and the existing Electric Power Law of the PRC.

C. The Tension between Legislative Development and Reform and the Principle of 'Legislative Precedence' in China

One of the critical features of the law is stability, while reform pursues changes to existing social relations. Dealing with the underlying tension between legislative development and reform is crucial to balancing legal adaptability and legal certainty.

China adopted the 'feel the way' method in the early stages of reforms and opening up. Now Chinese leadership pays more attention to combining the 'feel the way' method with the 'top-level design' approach, which emphasises the importance of legislative development in facilitating further reform. This is also reflected in the energy sector, as manifested by the progress made on enacting the upcoming Energy Law. The promotion of the principle of 'legislative precedence' [立法先行 in Chinese] aligns with the international experience that laws and regulations guide reform practice *ex-ante*. Specifically, this 'guidance' lays the foundation for reforms' basic principles, goals, steps, and general implementation mechanisms. Although specific reform measures are subject to a detailed design by reform executors, laws provide a fundamental framework for them in advance and ensure that the reforms are conducted within a specific scope to be legitimate. This

complies with the value of the rule of law that China is pursuing. The principle of 'legislative precedence' shows Chinese governance in the era of 'top-level design'. It attaches more importance to legislative development when dealing with the tension between it and reforms. However, this does not mean that China has given up the 'feel the way' method. On the contrary, there remain many examples of electricity sector reforms that still stick to it. For instance, China established the wholesale electricity spot market pilots in eight provinces before building up the national electricity spot market. The trial will inform legislators in the law-making process. This shows that the 'feel the way' method still has its value in the era of 'top-level design' in the energy sector.

III. OVERVIEW OF THE NEW ENERGY LAW AND OTHER BASIC LAWS IN THE ENERGY SECTOR

Based on the above theoretical lens of the interplay between reforms and legislative development, this section provides an overview of the energy legislation in the Chinese energy sector, focusing on the upcoming Energy Law of the PRC and the existing sector-specific energy laws in relatively near hierarchy. The overview aims at laying the foundation for the comparison between them in detail in the following section.

A. Painful Enactment Process of the New Energy Law Featuring the 'Symbiosis with the System'

After thirteen years of struggle, the National Energy Administration announced the 2020 Draft in April 2020. Upon completion of the law-making process, it will be the first omnibus legislation unifying the various laws governing critical aspects of the energy sector in the history of China, which will shape the governance of the electricity sector in the post-COVID-19 era.

This is not the first time China has attempted to enact the Energy Law. The Energy Law has undergone a painful process and demonstrated the feature of 'symbiosis with the system', which refers to the phenomenon of the interaction and close synchrony between the overall economic system in China and the evolution of energy legislation, as coined by one of the members of the drafting working group of the Energy Law [26].

The legislative motion of Energy Law in China can be traced back to the 1980s in the context of the worldwide Oil Crisis in the 1970s, which aroused international attention in legislation in the energy sector to facilitate the development of alternative energy sources to oil. China's response to this was the Chairman of the Standing Committee of the National People's Congress Ye Jianying's proposal of enacting economic laws in five key areas, including the energy sector, followed by the designation of the first National Energy Committee in 1981. The following 1990s witnessed the enactment of sector-specific laws, including the Coal Industry Law of the PRC [27] and the Electric Power Law. Unfortunately, because of the difficulties in establishing the legal regime for the energy sector in China, which involves multiple departments with a broad scope of interests and the intervention of administrative power, the enactment of Energy Law was put aside for nearly a decade. This is majorly constrained by the overall economic system in

China in the pre-marketisation of the Chinese economy. At that time, economic relations were based on the administrative distribution of interests, balanced through an administrative approach by departmental regulations and regulatory documents. The urgent need for Energy Law was not conspicuous at that stage. With the implementation of the market-oriented economic strategy in China, the economic relations in the energy sector grew complicated in markets, and the environmental problems grasped the strategic importance of sustainability and energy security. The enactment of the Energy Law regained momentum with the establishment of the National Energy Leadership Office [国家能源领导小组办公室 in Chinese] in 2005. Again, this represents a reflection of the feature of 'symbiosis with the system' -- that the legislative development of the Chinese energy sector goes hand-in-hand with the institutional development that was subject to ongoing reforms. The drafting workgroup constituted members from fifteen departments and organisations, which manifested the aim of drafting a comprehensive law for different energy sources. The drafting workgroup held the idea of making the Energy Law function as the 'constitutional law in the energy sector', which was expected to lay the foundation for sector-specific energy laws and build up a convergent legal system [26]. In this context, the enactment work restarted since 2006, and the first version of Draft for Comments of the Energy Law was published in the December of 2007 (hereinafter referred to as the 2007 Draft for Comments).

The 2007 Draft for Comments mirrored the transition of China's overall economic system from an administrative-based one to a more open and market-oriented one. Then the 2007 Draft for Comments was revised in 2008 and 2017, but the revision draft was not published to the public. Unfortunately, the following decade witnessed no substantial progress in the law-making of Energy Law. This is closely related to the stagnated progress of institutional reforms, which was projected onto the drafting work of Energy Law. This also reflects the feature of Energy Law's 'symbiosis with the system'. Similarly, China's energy sector legislation closely goes hand in hand with the energy sector restructuring and reforms. For example, the legislative work planning of the State Council of 2015 included the Energy Law as one of the most urgent projects of comprehensively deepening reforms and comprehensively the rule of law in China [28]. In the March of the same year, a new round of electricity market reform was embarked on as the No. 5 Document was issued [29]. The full-fledged reform efforts are formalised by legislation to consolidate and expand the achievements of reforms. On the other hand, Energy Law is expected to provide legal support for further reforms. In this sense, the Draft for Comments of Energy Law can also be regarded as the statement of reform achievement and embodiment of national will.

Based on the revision of the previous draft for approval, the recently updated version of Draft for Comment was published on 2020, 10 April. One of the most prominent differences between the 2007 Draft for Comments and the 2020 version is reflected by the positioning of the Energy Law in the entire legal system of the energy sector. The 2020 Draft for Comments

adopts the idea of making the Energy Law function both as the formalisation of key energy policies and code conduct for actors in the energy sector [26]. It condensed and simplified the 2007 version, evidenced by the reduction of chapters and provisions.

The long period of the enactment process reflects the complexity of the legislative work in the energy sector, given that the new Energy Law is a piece of comprehensive legislation covering different key energy sectors and touches upon the adjustment and balancing of interests between actors in these sectors. This lengthy process also mirrors the benefit game between the actors in different energy sectors.

B. Hierarchy of the New Energy Law in the Chinese Legal System of the Energy Sector

There have been diverse separate sector-specific laws and regulations governing coal, renewable energy, electricity, and energy conservation. This pre-dominance of these sector-specific laws creates the potential of overlapping with the new Energy Law. Despite this risk of overlapping, it is still necessary to make for the lack of a basic law governing the whole energy sector and coordinating different energy sectors in China [30]. In attachment No.2 of the drafting instructions of the 2020 Draft of Comments for the Energy Law, the necessity and aims of this legislation are justified from three aspects, including the urgent need to pursue the energy security strategy of 'four revolutions and one cooperation' (President Xi Jinping proposes this latest energy security strategy on the Sixth Session of the Central Economic Leadership Groups on 13 June 2014). 'Four revolutions' refers to the revolution of energy consumption, energy supply, and energy technology and energy system. 'One cooperation' means the comprehensive enhancement of international cooperation in the energy sector, the urgent need to promote energy development in high quality, and the urgent need to facilitate the modernisation of the energy governance system and ability [31]. One of the reasons why the Energy Law underwent such a painful process was the ambiguity of its positioning in China's legal system of the energy sector [32].

The upcoming Energy Law is expected to confirm and consolidate the experience of the ongoing electricity market reforms and create a friendly environment for RES-E. The role of the upcoming Energy Law is not leading or guiding the energy reforms but instead implementing the measure of the reforms and providing robust legal support for the governance of the energy sector in China [33]. This is due to the uncertainty of the reform agenda in the energy sector. The electricity market reform is relevant to RES-E integration because RES-E will ultimately be exposed to the electricity market and compete with fossil fuels-sourced electricity.

There remains uncertainty of the specific provisions until the formal finalisation of the upcoming Energy Law. As mentioned above, the upcoming Energy Law has undergone a long and complicated legislative process, and it might be still a long way to go before its official issuance. Once the Draft for Comment revision is finished, it has to be sent to the Ministry of Justice of the PRC pending review and approval. In completion of the deliberation drafts for further review, they need to be included

in the review plan of the State Council and coordinate with the legislative plan of the Standing Committee of the National People's Congress, according to the Legislation Law Article 66 [34]. On the grounds of its legal hierarchy as a long-awaited comprehensive basic law governing all the energy sectors, it has to be passed by the National People's Congress or its Standing Committee to finalise its promulgation process, according to Article 66 of the Legislation Law of the PRC [34]. The National Energy Administration releases this 2020 Draft for Comment during the drafting process; it has yet to become the Draft for Approval submitted to the Ministry of Justice for review. It is still at the initial stage in the whole legislative process.

The hierarchy of the new Energy Law in the Chinese legal system remains controversial to some extent. There are different patterns of the orientation of the Energy Law in academic discussion [30] [35] [36] [37]. Article 2 of the 2020 Draft for Comments further clarifies the legal status of the upcoming Energy Law as 'the law covering the scope of all the energy development, utilisation, supervision and management activities'. According to the defined scope of application, it is expected to serve as comprehensive legislation governing all energy sources in China's energy system. This suggests the fundamental status of the new Energy Law. Unfortunately, the second paragraph of this article provides that 'where any other law providing issues regarding energy development, utilisation, supervision and management otherwise, the other law prevails'. This statement impedes the application of Energy Law as the comprehensive superordinate law prevails over other sector-specific subordinate laws. This introduces another layer of complexity to the orientation of the upcoming Energy Law in China's whole energy law system.

However, the 2020 Draft for Comments provides a glimpse of the general directions of this long-awaiting legislation. Its relationship with existing laws and regulations and the hierarchy in the energy law system should be considered even before its finalisation. Rather than debating on the hierarchy of the Energy Law, the key is how to clarify its content and how to understand its core principles [32].

i. Analysis of the Provisions Regarding RES-E Integration in the 2020 Draft for Comments

It can be observed from the 2020 Draft for Comments that the upcoming Energy Law attaches significant emphasis to the development of renewable energy. Based on lessons drawn from the practical experience for many years, Article 44, Article 45, and Article 48 confirm the critical mechanisms of renewable energy development in the form of basic laws. These mechanisms include guaranteed integration and the quota scheme of renewable energy, priority feed-in to electricity networks, and the guaranteed purchase of planned electricity generation, according to Article 44, Article 45, and Article 48 of the 2020 Draft for Comments. In addition, Article 48 of the 2020 Draft for Comments confirmed the mechanism of energy-saving and low-carbon electricity dispatching proposed in the Thirteenth Five-year Plans of the Electricity Sector [38]. There are still debates over whether the new approach of 'energy-saving and low-carbon electricity dispatching' can be

compatible with the electricity market mechanisms. Since low-carbon dispatching does not necessarily follow the most economical maximisation, this new dispatching idea that fits the ongoing electricity market reforms is still open to discussion nowadays.

As an integral element of the RES-E integration issue, the 2020 Draft for Comments also enshrines the requirement of fair and open access to electricity networks at a basic law level for the first time. Article 53 requires that power grids be opened to all qualified energy generators and retailers, and other market players in a fair and non-discriminatory manner. Article 94 provides the supervision of the openness of natural monopolistic networks, including power grids, to facilitate fair competition and protect consumers' interests.

ii. Overview of Related Sector-Specific Laws and Regulations

The most important separate law concerning RES-E integration is the Renewable Energy Law, which is a sector-specific law covering renewable energy, including wind energy, solar energy, biomass energy, hydropower, geothermal energy, and ocean energy, according to Article 2 of the Renewable Energy Law [11].

Renewable Energy Law plays a fundamental role in resolving the issue of RES-E integration. Therefore, it is at the core of the examination of related separate laws in this research.

The Electric Power Law is also highly relevant to study RES-E integration since RES-E is ultimately consumed in secondary energy sources -- electricity. The Electric Power Law addresses the socio-economic relationship of construction of electricity-related projects and the generation, supply, and consumption of electricity (Article 2 of the Electric Power Law). It also touches upon the interest of RES-E generators.

In China's energy law system, the issue of RES-E integration is governed not only by the abovementioned basic sector-specific laws but also a series of regulations and government documents that accompanying the Renewable Energy Law and Electric Power Law. These regulations and government documents specify the basic principles and institutions stipulated in the basic laws. The one in the nearest legal hierarchy with the basic laws is the Regulation on the Administration of Power Grid Scheduling. The Regulation on the Administration of Power Grid Scheduling is one of the essential administrative regulations issued by the State Council concerning the operation of electricity networks. RES-E is subject to management by dispatch centres, who are responsible for the organising, directing, guiding, and coordinating power grid operation for safe, good-quality, and economical operation of electricity networks (Article 2 of the Regulation on the Administration of Power Grid Scheduling). It also applies to RES-E integration, especially when RES-E is fed into power grids in the case of centralised RES-E generation such as large-scale wind farms or solar power plants.

The relationship between the upcoming Energy Law and the existing sector-specific energy laws concerns the orientation of the upcoming Energy Law. As the omnibus law underpinning the sector-specific basic laws in the energy sector [39], the

upcoming Energy Law seeks to provide grounds for the making and amendment of the Renewable Energy Law, Electric Power Law. Separate sector-specific laws in the energy sector should only be enacted or revised according to the jurisprudential principles or institutions provided by the Energy Law [35]. At the same time, it should avoid simply repeating existing sector-specific laws and regulations. There are ongoing debates on the functions and positioning of the Energy Law in the legal system. This research assumes that it should be positioned as the fundamental law that coordinates different energy law sectors, fills the gap between diverse sector-specific laws, provides underlying energy strategies, essential principles, and addresses other common issues in the entire energy sector. The general principle for renewable energy development in the Energy Law is expected to strengthen the legal basis for renewable energy integration. The following section will discuss how the upcoming Energy Law may deliver a more desirable paradigm by drawing comparisons to understand the progress focusing on renewable energy integration.

IV. COMPARISON BETWEEN THE 2020 DRAFT FOR COMMENT AND OTHER SEPARATE LAWS AND REGULATIONS

With a focus on RES-E integration, this section compares the 2020 Draft for Comments and the other separate laws and regulations, including Renewable Energy Law, Electric Power Law, and Regulation on the Administration of Power Grid Scheduling. The comparison is drawn upon these laws because they are in the relatively near hierarchy in the legal system with the upcoming Energy Law and are closely related to renewable energy integration. Although the implementation relies on specific regulatory documents issued by local governments, examining laws in the higher hierarchy provides insights on overall directions. It analyses the RES-E integration issue into five key aspects, including the status of renewables, marketisation, incentive schemes, consumption mechanisms, and access to power grids.

A. Status Of Renewables

There is no mention of the status of renewable energy in the Regulation on the Administration of Power Grid Scheduling. This is because the main objective is not to deal with the taxonomies of different sources of electricity. When it comes to electricity scheduling or dispatching, electricity is usually seen as homogeneous in a given area, subject to the same scheduling rule. Differentiating the sources of electricity is not the mission of this Scheduling Regulation (See Article 1 of the Regulation on the Administration of Power Grid Scheduling states the aim). The Electric Power Law mentioned renewables once in Article 5, stating that the state encourages and supports electricity generation by renewable and clean energy resources (Article 5 of the Electric Power Law). This is only a declaration of principle without any specific mechanisms [40]. It treats the RES-E only as a means to support the electricity supply in rural areas, according to Article 48 of the Electricity Power Law [41]. The Renewable Energy Law further clarifies the status of renewables. Article 4 of the Renewable Energy Law gives renewables priority status for development and utilisation.

Renewable energy has risen in status further in the 2020 Draft for Comments, which can be observed through the statement of 'giving priority to the development of renewable energy, to optimise the overall energy structure', according to Article 4 of the 2020 Draft for Comments (Article 4 of the 2020 Draft for Comments). This is reemphasised in Article 32 and reflected in government procurement, which prioritises purchasing products and services that use renewable energy (Article 62 of the 2020 Draft for Comments).

B. Marketisation

The issue of marketisation matters because the RES-E will ultimately be integrated into electricity markets to reach end consumers, given that China is endeavouring to establish a competitive electricity market. In the light of the leveled cost of energy (LCOE) of onshore wind and solar PV energy decreased to the degree of achieving the grid parity at the consumer side during 2010-2019, according to the data from IRENA, RES-E will be exposed to market competition without support from public subsidies [42]. Therefore, RES-E integration is deeply tangled with the course of electricity market reforms [43]. On this ground, discussion on marketisation in China is inevitable to study renewable energy integration.

The Electric Power Law did not incorporate the issue of marketisation. Furthermore, the Scheduling Regulation provides that power grid scheduling shall comply with the requirements of the socialist market-oriented economy and the rules of electricity network operation, according to Article 2 of the Regulation on the Administration of Power Grid Scheduling. The Renewable Energy Law takes a step further. Article 4 provides that the state shall establish and promote the market for renewable energy by setting the overall target and other corresponding measures. It has been more than a decade since China started a new round of electricity market reform in 2015. The guiding principles are stipulated by Opinions of the State Council on Further Reforming the Electric Power System (also known as document No. 9) and complementary regulatory documents [44]. These documents rank relatively low in the legal hierarchy. The new Energy Law make for this by confirming the direction towards marketisation in the form of a separate chapter stipulating the market participants, market construction objectives, pricing mechanism, cost and pricing supervision, the content of market construction, and regulation of market order (see Chapter 5 of the 2020 Draft for comments).

C. Incentive Schemes

In general, there are two categories of incentives for renewable energy development, including price-based incentives and quantity-based incentives. The most commonly seen policy tools are the Feed-in tariff (FIT) and the Renewable Energy Portfolio Standards (RPS), often accompanied by the Tradable Green Certificate (TGC). The nature of the FIT is subsidies for RES-E, which may have distortion effects on market mechanisms, and it is deemed unsustainable tools if the renewable energy technologies mature and reach the grid-parity. At the same time, the RPS could be a better fit with

market mechanisms.

The Regulation on the Administration of Power Grid Scheduling does not provide these incentive policy tools specifically to RES-E. It leaves the space of designing incentive mechanisms for RES-E to other regulatory documents. The Electric Power Law does not mention the incentives specific to RES-E. As a basic law that aims explicitly at facilitating the development and utilisation of renewable energy, the Renewable Energy Law spends a chapter on providing economic incentives for renewables (Article 1 and Chapter 6 of the Renewable Energy Law). The Renewable Energy Law adopts the FIT to incentivise investment in renewables (Article 19, Article 20, and Article 22 of the Renewable Energy Law). The subsidies come from the Renewable Energy Development Fund, which derives from specialised national finance and the income of the RES-E surcharge (Article 24 of the Renewable Energy Law). The upcoming Energy Law provides further incentives for RES-E, but not in the form of subsidies. Instead, in the prospect of the grid-parity for wind and solar energy in China, it provides legal grounds for adjusting subsidies in the near future and leaves space for adopting other policy tools for RES-E (Article 45 and Article 46 of the 2020 Draft for Comments).

D. Consumption Mechanisms

As the Regulation on the Administration of Power Grid Scheduling and the Electric Power Law are laws and regulations at early stages, integration and consumption of RES-E did not constitute a problem. The Renewable Energy Law imposes the guaranteed full purchase requirement to promote the further development of renewables (Article 14 of the Renewable Energy Law). The subjects of responsibility to consume RES-E are grid companies, who shall sign a grid-connection agreement with RES-E generators to fully purchase the RES-E in the defined area (Article 14 of the Renewable Energy Law). In breach of the purchase requirement and if it caused economic losses to RES-E generators, the grid company shall be liable for such losses and correct. Refusing to make required corrections will be subject to a fine not exceeding the amount of the losses suffered by the relevant electricity generator (Article 29 of the Renewable Energy Law).

The Renewable Energy Law also encourages and supports the development and utilisation of renewables in rural areas, for example, as provided in Article 18, the Renewable Energy Law requires the government at or above the county level to provide financial support for renewable energy in rural areas (Article 18 of the Renewable Energy Law). Moreover, it establishes the renewable energy target mechanism and requires target setting at national and provincial levels (Article 7 of the Renewable Energy Law). The administrative department of energy of the State Council shall set the target together with the governments at the provincial level according to the national long- and medium-term target for the development and utilisation of renewable energy (Article 8 of the Renewable Energy Law).

With the higher penetration of RES-E in the energy system, the curtailment issue of wind, solar and hydro energy arose, and the upcoming Energy Law deals with it by establishing the rules

for guaranteeing the consumption of RES-E, requiring the minimum proportion of electricity from renewable energy sources of the overall electricity consumption at the provincial level. The subjects of the consumption mechanism include electricity suppliers, retailers, and end-users that participate in electricity market transactions (Article 45 of the 2020 Draft for Comments).

These subjects of the RES-E consumption mechanism shall achieve the minimum proportion in their respective regions; But if not, they may fulfil their obligations by purchasing quotas from other market players that have reached the excessive quota. According to the situation of the transactions of purchasing quotas, relevant departments of the State Council shall make corresponding adjustments to the subsidy policy for electricity generation by renewable energy (Article 45 of the 2020 Draft for Comments).

In terms of the renewable energy development in rural areas, the 2020 Draft for Comment proposed the measure of 'localised consumption', which encourages the exploitation and utilisation of renewable energy in town and the rural regions and builds a distributed clean energy supply system featuring the complementation of multiple energy sources (Article 47 of the 2020 Draft for Comments). This echoes the principle of supporting energy development in rural areas and increasing the proportion of clean energy in the total energy consumption in rural areas in the general provisions of the 2020 Draft for Comment (Article 13 of the 2020 Draft for Comments).

Moreover, the upcoming Energy Law confirms the renewable energy target mechanism. It provides that the renewable energy targets will be included in the restrictive indicators of the national economic and social development plan and annual implementation plans. These targets will be broken down to governments at provincial levels for implementation (Article 44 of the 2020 Draft for Comments).

E. Access to Power Grids and Dispatching

The Regulation on the Administration of Power Grid Scheduling stipulates the basic rules for electricity dispatching. It requires power grids to follow the principle of uniform scheduling and hierarchical administration (Article 4 of the Regulation on the Administration of Power Grid Scheduling). All grid-connected electricity generators or grid companies shall obey the uniform scheduling of the dispatching centres (Article 25 of the Regulation on the Administration of Power Grid Scheduling). When grid integration is necessary, grid-connection agreements shall be concluded between electricity generators and grid companies, or between grid companies, under the principle of equality, mutual benefit, and consultation before the strict implementation (Article 26 of the Regulation on the Administration of Power Grid Scheduling).

The principle of uniform scheduling and hierarchical administration also appears in the Electric Power Law (Article 21 of the Electric Power Law). It also provides that grid integration is encouraged between electricity generators and grid companies, as well as between power grids; Grid operators are obliged to accept the request for grid integration by qualified electricity generation enterprises; a similar

requirement for concluding grid-connection agreement is stipulated, and it adds that administration department at or above the provincial level shall coordinate when parties fail to reach an agreement on grid-connection issue (Article 22 of the Electric Power Law). In addition, the Electric Power Law provides the liability of disobeying dispatching rules by an employee of electricity enterprises (Article 74 of the Electric Power Law).

The encouragement for RES-E connecting to power grids is provided by Article 13 of the Renewable Energy Law, which requires that the grid-connection project of RES-E shall obtain an administrative license or register according to related laws and regulations (Article 13 of the Renewable Energy Law). It also requires a competent administration department to stipulate specific priority dispatching rules; grid companies shall fully purchase RES-E, which meets the grid connection standards within its defined territory and improve the ability to absorb RES-E and provide grid connection services to RES-E generators (Article 14 of the Renewable Energy Law).

The administration of access to electricity networks is defined by Article 53 of the 2020 Draft for Comment, which emphasises the open and fair principle of access regulation. It requires that the mechanism for grid infrastructure access should be improved to allow fair and non-discriminatory access by all energy generators, retailers, and other market players; it further emphasises that illegal restriction to the access to networks is prohibited and that facilities, equipment as well as product that request grid connection shall be standard-compliant in accordance to the relevant regulations (Article 53 of the 2020 Draft for Comments). This fair and open access is subject to supervision by competent energy administration departments to facilitate fair competition and protect the interest of consumers (Article 94 of the 2020 Draft for Comments). The liability for breach of this fair and open access obligation, or the transmission infrastructure, equipment, or product not meeting the required national standards, is a correction as required by the energy administrative department; criminal liability applies if economic losses are entailed (Article 108 of the 2020 Draft for Comments). In terms of dispatching and scheduling, the 2020 Draft for Comments confirms that the dispatching centres are integrated into corresponding grid companies, and RES-E will be prioritised in dispatching orders (Article 48 of the 2020 Draft for Comments). This echoes the proposal of the adoption of the low-carbon and energy-saving dispatch in the Thirteenth Five-Year Plan.

V. FINDINGS AND CONCLUSIONS

China has explicitly embraced the ‘principle of legislative precedence’ in the recent round of electricity market reforms. However, the delayed enactment process of the new Energy Law seems not strictly to stick to this principle. Given the potential problems that would arise due to the legal certainty and the legal adaptability, China needs to adhere to the ‘principle of legislative precedence’. The upcoming Energy Law can serve as a timely reminder of the value of legislation on deepening electricity market reforms. It validates the best practice of reform trials and provides a more solid legal support

for the legality of reforms in the form of the basic law in the long run. It can also facilitate the implementation of further reform steps, including the measures of integrating higher shares of renewable energy into electricity markets in the post-COVID-19 era. This section presents the findings and concludes the previous discussion.

A. Findings: A More Friendly Paradigm for Renewable Energy Integration

This research observes a more salient rise in the status of renewable energy in the 2020 Draft for Comments and hopefully in the upcoming Energy Law. The direction of energy market reforms is clarified and more explicit, which helps end the ongoing debate on China’s swing between planning and marketisation in the electricity sector. It is expected to provide legal support for a more systematic marketisation and hence the legal basis for RES-E’s participation in electricity markets in the future. Moreover, it paves the way for dealing with the grid-parity and access issue. Also, it leaves legislative space for desubsidisation or at least the adjustment of subsidies for RES-E, which brings the importance of incentive mechanisms and consumption mechanisms to the fore.

The localised absorption of RES-E mentioned in 2020 Draft Comments highlights RES-E integration, inferring a more bottom-up approach. The subject of integration responsibilities includes not only grid companies but also electricity suppliers, retailers, and end consumers. This expansion of the subjects of integration responsibility is inconsistent with the existing Renewable Energy Law, but a more explicit definition of responsibility can be expected. This could strengthen the legal support and overall guidance for RES-E integration. Unfortunately, it is still unclear how to coordinate the RES-E integration across different provinces, which remains a critical hurdle of RES-E integration due to the reverse distribution of renewable energy resources and demand for RES-E in China.

Regarding access to networks and electricity dispatching, the 2020 Draft for Comments emphasises the fair and non-discriminatory principle of grid-connection for electricity generators, retailers, and end consumers. Moreover, it confirms two fundamental principles – marketisation and low-carbon development apply to crucial energy sectors. Therefore, it is reasonable to expect that the electricity dispatching mechanism will reflect a balance and coordination of these two principles.

B. Conclusions and Further Research

The upcoming Energy Law prioritises the development of renewable energy. It demonstrates the determination of clean energy transition by solidifying legal grounds in the form of the basic law in the energy sector.

The above findings echo the proposal of ‘building up a novel electricity system dominated by renewable energy, as declared by President Xi Jinping at the United Nations General Assembly in 2019. It is reasonable to expect a more open and well-organised electricity market to absorb high shares of RES-E. The upcoming Energy Law is expected to confirm and consolidate the experience of the ongoing electricity market reforms and create a friendly environment for RES-E. With

more well-designed incentive schemes, there are good reasons to expect a period of prosperous development in the coming years. However, it does neither fundamentally change nor define the dispatching mechanism. This is reasonable because electricity market reforms are still ongoing, and more exploration efforts are necessary before fastening to a particular type of dispatching mechanism. Besides, in the post-pandemic era, the new Energy Law is expected to play an indispensable role in guiding the RES-E integration dealing with the impacts that the COVID-19 caused to the RES-E industry. A question remains -- how to coordinate the principle of marketisation and low-carbon transition of the electricity system through the adjustment of dispatching mechanism? How can regulation on RES-E integration be coordinated with the marketisation process in the post-COVID-19 era? Further research is required to understand these questions. At least it is reasonable to believe that the upcoming new Energy Law would adopt a more open and coordinated paradigm of RES-E integration compared with existing Renewable Energy Law, Electric Power Law, and the Regulation on the Administration of Power Grid Scheduling examined by this research.

ACKNOWLEDGMENT

The author thanks Professor Anatole Boute and Professor Hao Zhang at the Faculty of Law of the Chinese University of Hong Kong, who provided support and insight to this paper.

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